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PATENT ADMINISTRATOR
KATTEN MUCHIN ROSENMAN LLP
1025 THOMAS JEFFERSON STREET, N.W.
EAST LOBBY: SUITE 700
WASHINGTON, DC 20007-5201

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| EXAMINER |
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BOWERS, NATHAN ANDREW

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| ART UNIT | PAPER NUMBER |
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1744

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| MAIL DATE | DELIVERY MODE |
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06/15/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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|------------------------------|-------------------------------|-----------------------------|--|
| Office Action Summary | Application No. 10/697,870 | Applicant(s) REID ET AL. | |
| | Examiner Nathan A. Bowers | Art Unit 1744 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 1-5, 8 and 9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6, 7 and 10-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

- 1) Claims 6, 7, 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacDonald "Bioartificial livers" in view of Minuth (US 6187053).

With respect to claims 6, 13 and 15, MacDonald discloses a device for maintaining viable eukaryotic cells. The device comprises a woven fabric forming an annular compartment having an annular space, and at least two additional compartments adjacent and coaxial to the annular space. Each compartment is fully capable of containing a liquid. See the "Coaxial-Type Hollow-Fiber Bioreactors" section and Figure 21.7 on pages 276 and 277. Since MacDonald teaches that air mixtures flow through the intracapillary space, an integral aeration supply must be provided. McDonald, however, does not expressly state that the fabric comprises a biodegradable polymeric component.

Minuth discloses a bioreactor perfusion chamber (Figure 6:13) in which cells (Figure 5:9) are cultured upon a carrier substrate (Figure 6:6). This is described in column 3, line 42 to column 4, line 15. Column 3, lines 15-35 state that biodegradable polyactide fibers are coated upon the carrier in order to interact with the cells.

MacDonald and Minuth are analogous art because they are from the same field of endeavor regarding bioreactor systems.

At the time of the invention, it would have been obvious to incorporate polyactide materials in the woven bioreactor structures disclosed by MacDonald. Minuth states in column 3, lines 15-35 that biodegradable polyactide fibers work to promote natural cell growth during the culturing process. Polyactide fibers are considered to be well known in the art, and their inclusion into the system of MacDonald would have required only minor structural alterations.

With respect to claim 7, MacDonald and Minuth discloses the apparatus of claim 6 wherein the woven fabric comprises a woven polyester. Specifically, MacDonald discloses the use of cellulose acetate.

2) Claims 6, 7, 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martinez (US 6582955) in view of Minuth (US 6187053).

With respect to claims 6, 13 and 15, Martinez discloses a device for maintaining viable eukaryotic cells comprising a woven fabric (Figure 5:18) forming an annular compartment having an annular space. At least two additional compartments adjacent and coaxial to the annular space are provided. Each compartment is fully capable of holding a liquid. This is described in column 2, lines 53-67 and column 4, line 66 to column 5, line 65. Column 4, lines 1-7 indicate that oxygen is delivered to fluid moving through the annular space. Therefore, an aeration supply must be provided. Martinez, however, does not expressly state that the fabric comprises a biodegradable polymeric component:

Minuth discloses a bioreactor perfusion chamber (Figure 6:13) in which cells (Figure 5:9) are cultured upon a carrier substrate (Figure 6:6). This is described in column 3, line 42 to column 4, line 15. Column 3, lines 15-35 state that biodegradable polylactide fibers are coated upon the carrier in order to interact with the cells.

Martinez and Minuth are analogous art because they are from the same field of endeavor regarding bioreactor systems.

At the time of the invention, it would have been obvious to incorporate polylactide materials in the woven bioreactor structures disclosed by Martinez. Minuth states in column 3,

lines 15-35 that biodegradable polylactide fibers work to promote natural cell growth during the culturing process. Polylactide fibers are considered to be well known in the art, and their inclusion into the system of Martinez would have required only minor structural alterations.

With respect to claim 7, Martinez and Minuth disclose the apparatus in claim 6 wherein the woven fabric comprises a woven polyester. Column 3, lines 52-61 of Martinez suggest the use of mixed ester cellulose hollow fibers.

With respect to claim 10, Martinez discloses a bioreactor comprising a housing (Figure 3:17) that includes an array of a plurality of modules of textile vasculatures. Each module comprises a plurality of coaxial textile vasculatures and a plurality of compartments. A first compartment is defined by the inner side of the innermost textile vasculature (Figure 5:19), and a second compartment is defined by a respective annular space formed by the outer textile vasculature (Figure 5:18). An outermost compartment (Figure 5:15) is defined by a space within the inner side of the housing which is not occupied by the plurality of modules. This design is described in column 2, lines 53-67 and column 4, line 66 to column 5, line 65. Column 4, lines 1-7 indicate that fluids are moved through the first compartment in order to deliver oxygen to fluid moving through the second compartment. Accordingly, Martinez discloses a gas introduction means (Figure 4:24) integral to the housing and a gas expiration means (Figure 4:25) integral to the housing. It is understood that Martinez teaches in column 5, lines 10-21 that these inlets and outlets are intended for the facilitating the flow of a hemodialysis fluid, rather than a gas. However, since Martinez does disclose a desire to provide an oxygen supply to the

Art Unit: 1744

annular space using the first compartment, the disclosed introduction and expiration means are considered to be fully capable of delivering and withdrawing a gas to and from the first compartment.

Martinez, however, does not expressly state that the fabric comprises a biodegradable polymeric component.

Minuth discloses a bioreactor perfusion chamber (Figure 6:13) in which cells (Figure 5:9) are cultured upon a carrier substrate (Figure 6:6). This is described in column 3, line 42 to column 4, line 15. Column 3, lines 15-35 state that biodegradable polyactide fibers are coated upon the carrier in order to interact with the cells.

Martinez and Minuth are analogous art because they are from the same field of endeavor regarding bioreactor systems.

At the time of the invention, it would have been obvious to incorporate polyactide materials in the woven bioreactor structures disclosed by Martinez. Minuth states in column 3, lines 15-35 that biodegradable polyactide fibers work to promote natural cell growth during the culturing process. Polyactide fibers are considered to be well known in the art, and their inclusion into the system of Martinez would have required only minor structural alterations.

With respect to claim 11, Martinez and Minuth disclose the apparatus in claim 10 wherein the woven fabric comprises a woven polyester. Column 3, lines 52-61 of Martinez suggest the use of mixed ester cellulose hollow fibers.

With respect to claim 14, Martinez and Minuth disclose the apparatus in claim 10 wherein viable cells are introduced to the second compartment formed between the annular woven fibers. A nutrient medium is passed through the first compartment in order to accommodate cell growth. This is described in claim 1 of the Martinez reference. Martinez discloses in the "Background" section that it is well known in the art to utilize a parallel flow of cells and nutrients in coaxial bioreactors.

3) Claims 6, 7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martinez (US 6582955) in view of Minuth (US 6187053), Nunez (US 6840958) and/or Kapadia (US 4816028).

Martinez and Minuth disclose the apparatuses set forth in claims 6, 7 and 13 as previously described in the rejections above. It is believed that Martinez discloses that the annular compartments are formed by a woven fabric. However, if it is determined that Martinez does not teach that the fabric is woven, then Martinez fails to anticipate the claimed devices.

Nunez and Kapadia both disclose the use of woven polyester vasculatures.

Martinez, Minuth, Nunez and Kapadia are analogous art because they are from the same field of endeavor regarding textile vasculatures.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to ensure that the vasculatures disclosed by Martinez were of a woven polyester. Woven polyester vasculatures are considered to be well known in the art, as evidenced by Nunez and Kapadia. Woven grafts are beneficial because they are generally characterized by a uniform

surface resulting in smoother blood flow. Woven materials can be created at various porosities in order to facilitate the diffusion of desired compounds.

4) Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Martinez (US 6582955) in view of Minuth (US 6187053) and Ghezzi (US 5194157).

Martinez discloses a bioreactor comprising a housing (Figure 3:17) that includes an array of a plurality of modules of textile vasculatures. Each module comprises a plurality of coaxial textile vasculatures and a plurality of compartments. A first compartment is defined by the inner side of the innermost textile vasculature (Figure 5:19), and a second compartment is defined by a respective annular space formed by the outer textile vasculature (Figure 5:18). An outermost compartment (Figure 5:15) is defined by a space within the inner side of the housing which is not occupied by the plurality of modules. This design is described in column 2, lines 53-67 and column 4, line 66 to column 5, line 65. Column 4, lines 1-7 indicate that fluids are moved through the first compartment in order to deliver oxygen to fluid moving through the second compartment. Accordingly, Martinez discloses an introduction means (Figure 4:24) integral to the housing and an expiration means (Figure 4:25) integral to the housing, each of which are fully capable of accommodating the movement of gases through the bioreactor.

Martinez, however, does not expressly state that the fabric comprises a biodegradable polymeric component.

Minuth discloses a bioreactor perfusion chamber (Figure 6:13) in which cells (Figure 5:9) are cultured upon a carrier substrate (Figure 6:6). This is described in column 3, line 42 to

Art Unit: 1744

column 4, line 15. Column 3, lines 15-35 state that biodegradable polylactide fibers are coated upon the carrier in order to interact with the cells.

Martinez and Minuth are analogous art because they are from the same field of endeavor regarding bioreactor systems.

At the time of the invention, it would have been obvious to incorporate polylactide materials in the woven bioreactor structures disclosed by Martinez. Minuth states in column 3, lines 15-35 that biodegradable polylactide fibers work to promote natural cell growth during the culturing process. Polylactide fibers are considered to be well known in the art, and their inclusion into the system of Martinez would have required only minor structural alterations.

The combination of Martinez and Minuth still differs from Applicant's claimed invention because Martinez does not expressly indicate the presence of multiple bioreactors that are serially linked.

Ghezzi discloses a blood purifying system in which a plurality of bioreactors are serially linked. Specifically, Ghezzi indicates that blood moves sequentially from a hemofiltration element (Figure 1:2) to a hemodialysis element (Figure 1:3). This is described in column 2, line 61 to column 3, line 30. Blood is processed in both elements through the exchange of fluids across permeable membranes.

Martinez and Ghezzi are analogous art because they are from the same field of endeavor regarding blood processing bioreactors.

At the time of the invention, it would have been obvious to link the bioreactors disclosed by Martinez in a series in order to more thoroughly process the fluids moving through the units.

Art Unit: 1744

Ghezzi teaches that arrangements that utilize serially linked bioreactors are beneficial because they allow each individual bioreactor unit to specialize in a specific operation. By connecting a plurality of Martínez's bioreactors in succession, one would have been able to ensure that blood is fully processed before it is returned to a patient.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 6, 7 and 10-13 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3, 23 and 29 of copending Application No. 11/226351. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of Application No. 11/226351 are generic to the claims of the instant application. Application No. 11/226351 includes all of the limitations set forth in the instant invention, however does not specifically disclose the use of

vasculatures. Application No. 11/226351 does include limitations in the claims regarding the use of hollow fibers containing liver cells.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

Applicant's arguments filed 30 April 2007 with respect to the 35 U.S.C. 102 rejections involving MacDonald and Martinez have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground of rejection is made in view of the combination of MacDonald with Minuth and the combination of Martinez with Minuth.

Minuth clearly addresses the deficiencies of the MacDonald and Martinez references by indicating that it is known in the art to utilize biodegradable polyactide materials in the construction of bioreactor supports. Since Minuth states in column 3, lines 15-35 that polyactide fibers work to promote natural cell growth during the culturing process, it would have been obvious to utilize these fibers in the apparatuses of MacDonald and Martinez in order to facilitate cell attachment and expansion.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Steuer "Biohybride nerve guide for regeneration: degradable polyactide fibers

coated with a rat Schwann cells" reference discloses the state of the art regarding the use of polyactide materials in bioreactors.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

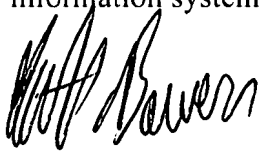
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan A. Bowers whose telephone number is (571) 272-8613. The examiner can normally be reached on Monday-Friday 8 AM to 5 PM.

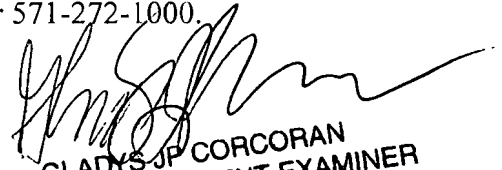
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gladys Corcoran can be reached on (571) 272-1214. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1744

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



NAB


GLADYS J. CORCORAN
SUPERVISORY PATENT EXAMINER